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**UNITED STATES UTILITY PATENT APPLICATION**

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**TITLE:** UMBRELLA DEVICE

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# UMBRELLA DEVICE

## Technical Field

The present invention relates to collapsible umbrellas.

## Background of the Invention

5           Umbrellas are used to provide the user with protection against rain, sunlight or snow and are generally carried by hand. Conventional collapsible umbrellas generally either have a fixed shaft or a telescopically extendable shaft. In order to expand the canopy, it is necessary to point the shaft away from the user to avoid the expanding canopy from contacting the user.

10           US Patent No. 4193415 discloses an umbrella device having a collapsible shaft comprising a plurality of pivotally connected members arranged in scissor fashion. In order to prevent the expanding canopy from contacting the user during deployment, it is necessary to point the device away from the user until the canopy is fully expanded and then hold the umbrella upright for use. This may not be  
15           convenient for the user in circumstances where pointing the umbrella away from the user is difficult or where it is desirable to hold the device in a fixed position during deployment and use of the umbrella.

          It is also often inconvenient to carry an umbrella particularly if the user requires the use of both hands for other purposes. Further, carrying a wet umbrella  
20           after use is somewhat unpleasant.

          Devices for supporting an umbrella without the use of hands are known. Such devices involve the use of a holder, an attachment or the like to mount an umbrella in the in-use position and detach it after use. The drawback of these devices is that although the user wears the holder attached to the torso, it is still necessary to  
25           take a separate umbrella by hand and mount and detach it, before and after every use. The user also has to carry the umbrella by hand when not in use.

          US Patent No. 4188965 discloses a body mounted umbrella having a support shaft extending from a very wide waist belt worn by the user. The belt is made of a rigid metal which is uncomfortable to wear and makes sitting difficult. Although this  
30           device enables the user to fold and unfold a mounted umbrella without requiring the umbrella to be removed from the device, the umbrella shaft must be arranged behind

the user to avoid interfering with the face of the user and is therefore not easily accessible.

It is therefore desirable to provide an umbrella device that can be held in the same orientation during deployment and use of the umbrella. It is further desirable to  
5 provide an umbrella device that can be attached to the torso of the user both when extended in use and when retracted and stored, without the need to carry a separate umbrella by hand. It is further desirable to provide a compact umbrella device that can be deployed and retracted without interfering with the face of the user. It is further desirable to provide an umbrella device that is readily accessible and can be  
10 worn at the front of the torso without obstructing the view of the user.

### Object of the Invention

It is the object of the present invention to substantially overcome or at least ameliorate one or more of the disadvantages of the prior art and/or achieve one or more of the above desired outcomes.

### Summary of the Invention

Accordingly, the present invention provides an umbrella device comprising:  
a canopy;  
a canopy mechanism adapted to expand and collapse said canopy;  
a base; and

an arm assembly disposed between said base and said canopy mechanism, said arm assembly having a proximal end pivotally connected to said base and a distal end pivotally connected to said canopy mechanism, said arm assembly being operable, by pivoting said proximal end relative to said base, between a retracted configuration and a protracted configuration, said arm assembly protracting when said proximal end pivots in a first pivotal direction and retracting when said proximal end pivots in a second opposite pivotal direction.

The canopy mechanism may be disposed in a first direction relative to said base in said retracted configuration and in a second direction relative to said base, substantially transverse to said first direction, in said protracted configuration.

The distal end of the arm assembly may follow an approximately arcuate path between said retracted and protracted configurations.

The distal end of the arm assembly may be operatively connected to the canopy mechanism such that the operation of the umbrella device simultaneously expands the canopy in the extended open configuration and collapses the canopy in the retracted closed configuration. This arrangement provides the umbrella device an automation feature, allowing both hands of the user free for other purposes.

The canopy mechanism may comprise a shaft, a slide adapted for axial movement on the shaft and a plurality of foldable ribs operatively associated with the canopy and the slide, wherein the canopy mechanism is adapted to expand and collapse the canopy by axial movement of the slide.

The arm assembly may comprise a plurality of operatively associated elongate members, each of the members being arranged substantially adjacent to the base in the retracted closed configuration and extending substantially vertically of the base in the extended open configuration.

5       The plurality of members may comprise at least one pair of members arranged in scissor fashion wherein the paired members are pivotally connected at an intermediate portion of each member and wherein the paired members pivot in opposite directions to one another during the operation of the umbrella device.

The plurality of members may comprise:

- 10       a first member pivotally connected at a proximal end to the base;  
      a second member pivotally connected at a proximal end to the base;  
      a third member pivotally connected at a proximal end to a distal end of the second member and having an intermediate portion pivotally connected to an intermediate portion of the first member;
- 15       a fourth member pivotally connected at a proximal end to a distal end of the second member and pivotally connected at a distal end to the slide;  
      a fifth member pivotally connected at a proximal end to the distal end of the first member and pivotally connected at a distal end to

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          It is also often inconvenient to carry an umbrella particularly if the user requires the use of both hands for other purposes. Further, carrying a wet umbrella  
20 after use is somewhat unpleasant.

          Devices for supporting an umbrella without the use of hands are known. Such devices involve the use of a holder, an attachment or the like to mount an umbrella in the in-use position and detach it after use. The drawback of these devices is that although the user wears the holder attached to the torso, it is still necessary to  
25 take a separate umbrella by hand and mount and detach it, before and after every use. The user also has to carry the umbrella by hand when not in use.

          US Patent No. 4188965 discloses a body mounted umbrella having a support shaft extending from a very wide waist belt worn by the user. The belt is made of a rigid metal which is uncomfortable to wear and makes sitting difficult. Although this  
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the user to avoid interfering with the face of the user and is therefore not easily accessible.

It is therefore desirable to provide an umbrella device that can be held in the same orientation during deployment and use of the umbrella. It is further desirable to  
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10 worn at the front of the torso without obstructing the view of the user.

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It is the object of the present invention to substantially overcome or at least ameliorate one or more of the disadvantages of the prior art and/or achieve one or more of the above desired outcomes.

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Accordingly, the present invention provides an umbrella device comprising:  
a canopy;  
a canopy mechanism adapted to expand and collapse said canopy;  
a base; and

an arm assembly disposed between said base and said canopy mechanism, said arm assembly having a proximal end pivotally connected to said base and a distal end pivotally connected to said canopy mechanism, said arm assembly being operable, by pivoting said proximal end relative to said base, between a retracted configuration and a protracted configuration, said arm assembly protracting when said proximal end pivots in a first pivotal direction and retracting when said proximal end pivots in a second opposite pivotal direction.

The canopy mechanism may be disposed in a first direction relative to said base in said retracted configuration and in a second direction relative to said base, substantially transverse to said first direction, in said protracted configuration.

The distal end of the arm assembly may follow an approximately arcuate path between said retracted and protracted configurations.

The distal end of the arm assembly may be operatively connected to the canopy mechanism such that the operation of the umbrella device simultaneously expands the canopy in the extended open configuration and collapses the canopy in the retracted closed configuration. This arrangement provides the umbrella device an automation feature, allowing both hands of the user free for other purposes.

The canopy mechanism may comprise a shaft, a slide adapted for axial movement on the shaft and a plurality of foldable ribs operatively associated with the canopy and the slide, wherein the canopy mechanism is adapted to expand and collapse the canopy by axial movement of the slide.



The arm assembly may comprise a plurality of operatively associated elongate members, each of the members being arranged substantially adjacent to the base in the retracted closed configuration and extending substantially vertically of the base in the extended open configuration.

5       The plurality of members may comprise at least one pair of members arranged in scissor fashion wherein the paired members are pivotally connected at an intermediate portion of each member and wherein the paired members pivot in opposite directions to one another during the operation of the umbrella device.

The plurality of members may comprise:

- 10       a first member pivotally connected at a proximal end to the base;
- a second member pivotally connected at a proximal end to the base;
- a third member pivotally connected at a proximal end to a distal end of the second member and having an intermediate portion pivotally connected to an intermediate portion of the first member;
- 15       a fourth member pivotally connected at a proximal end to a distal end of the second member and pivotally connected at a distal end to the slide;
- a fifth member pivotally connected at a proximal end to the distal end of the first member and pivotally connected at a distal end to an intermediate portion of the fourth member; and
- 20       a sixth member pivotally connected at a proximal end to the distal end of the first member and pivotally connected at a distal end to the shaft proximal end.

Alternatively, the plurality of members may comprise:

- a first member pivotally connected at a proximal end to the base;
- a second member pivotally connected at a proximal end to the base;
- 25       a third member pivotally connected at a proximal end to a distal end of the second member and having an intermediate portion pivotally connected to an intermediate portion of the first member;
- a fourth member pivotally connected at a proximal end to the distal end of the third member;
- 30       a fifth member pivotally connected at a proximal end to the distal end of the first member and having an intermediate portion pivotally connected to an intermediate portion of the fourth member;

a sixth member pivotally connected at a proximal end to the distal end of the fifth member and pivotally connected at a distal end to the slide;

a seventh member pivotally connected at a proximal end to the distal end of the fourth member and pivotally connected at a distal end to an intermediate portion  
5 of the sixth member;

an eighth member pivotally connected at a proximal end to the distal end of the fourth member and pivotally connected at a distal end to the shaft proximal end.

Alternatively, the plurality of members may comprise several pairs of members arranged in scissor fashion.

10 The canopy mechanism may comprise:

a shaft having a proximal end connected to an intermediate point of the arm assembly between the arm assembly proximal and distal ends and a distal end connected to the canopy; and

a slide adapted for axial movement on the shaft, the slide being operatively  
15 associated with the canopy to expand the canopy when driven towards the shaft distal end and collapse the canopy when driven towards the shaft proximal end;

wherein the slide is connected to the arm assembly distal end such that operation to the extended open configuration displaces the arm assembly distal end from the intermediate point, driving the slide toward the shaft distal end and operation  
20 to the retracted closed configuration retracts the arm assembly distal end towards the intermediate point, driving the slide toward the shaft proximal end.

The slide may be operatively associated with the canopy by means of a plurality of radial ribs, each rib comprising a plurality of operatively associated longitudinal links, wherein the links of each rib are adapted to align longitudinally in  
25 the open configuration to expand the canopy and to fold adjacently in the closed configuration to collapse the canopy and wherein the links are adapted to fold the canopy such that in the closed configuration, an outermost link of each rib folds the peripheral edge of the canopy adjacent the shaft distal end. The outermost link may also be the longest link of each rib.

30 The arm assembly may be adapted to form a bifurcated Y-shape in the extended open configuration. Each branch of the bifurcated arm assembly may be operatively connected to the canopy mechanism such that the operation of the

umbrella device simultaneously expands the canopy in the extended open configuration and collapses the canopy in the retracted closed configuration.

In this form, the canopy mechanism may comprise a pair of shafts, each shaft having a slide adapted for axial movement on the shaft and a plurality of foldable ribs operatively associated with the canopy and the slides, wherein the canopy mechanism is adapted to expand and collapse the canopy by axial movement of the slides.

In this form, the arm assembly may comprise:

a first member pivotally connected at a proximal end to the base;

a pair of second members pivotally connected at a proximal end to the base and adapted to pivot in parallel to one another;

a pair of third members pivotally connected at a proximal end to a distal end of the pair of second members and having an intermediate portion pivotally connected to an intermediate portion of the first member;

a pair of fourth members, each pivotally connected at a proximal end to a distal end of one of the third members;

a pair of fifth members pivotally connected at a proximal end to a distal end of the first member, each of the fifth members having an intermediate portion pivotally connected to an intermediate portion of one of the fourth members;

a pair of sixth members, each pivotally connected at a proximal end to the distal end of one of the fifth members and pivotally connected at a distal end to one of the slides;

a pair of seventh members, each pivotally connected at a proximal end to a distal end of one of the fourth members and pivotally connected at a distal end to an intermediate portion of one of the sixth members;

a pair of eighth members, each pivotally connected at a proximal end to the distal end of one of the fourth members and pivotally connected at a distal end to the proximal end of one of the shafts.

The umbrella device may further comprise a locking mechanism for locking said arm assembly in at least one of said retracted and protracted configurations.

The locking mechanism may comprise a spring biased catch provided on said base, said catch being adapted to be engaged and depressed by a locking pin provided on said arm assembly, during said operation of said arm assembly in said first pivotal

direction and to retain said locking pin adjacent said base in said protracted configuration.

The base may be adapted to be secured to the body of a user. The base may be secured to the user by means of a waist strap. Alternatively, the base may be secured to the user's belt by means of a spring biased clip. The base may also be secured to the user by means of one or more straps.

The umbrella device may further comprise a casing adapted to enclose the arm assembly, canopy mechanism and canopy, when the umbrella device is in the retracted closed configuration. The casing may comprise at least one flap secured to the base and adapted to wrap around and enclose the arm assembly, canopy mechanism and canopy. The casing may comprise at least two flaps secured to opposite sides of the base, the flaps adapted to be fastened together to enclose the arm assembly, canopy mechanism and canopy. The flaps may be fastened by means of hook and loop type fasteners or other fastening means.

The base may further comprise an elongate slidable extension having a lower end adapted to be secured to the user wherein the base is adapted to slide vertically along the extension raising or lowering the base with respect to the secured lower end of the extension.

### **Brief Description of the Drawings**

A preferred form of the present invention will now be described by way of example with reference to the accompanying drawings, wherein:

Figure 1 depicts a first embodiment of the umbrella device secured to a user  
5 in an extended open configuration;

Figure 2 depicts the first embodiment secured to a user in a retracted closed configuration;

Figure 3 is a perspective view of the first embodiment;

Figure 4 is a rear view of the first embodiment;

10 Figure 5 depicts the first embodiment secured to a user;

Figure 6 is a structural view of the first embodiment in the retracted closed configuration;

Figure 7 is a partial structural view of the first embodiment depicting part of the canopy device in detail;

15 Figure 8 is a structural view of the first embodiment during extension/retraction and fully extended as shown in phantom;

Figure 9 depicts a member of the arm device of the first embodiment;

Figure 10 depicts a slide of the first embodiment;

20 Figure 11 is a partial view of the first embodiment during extension/retraction;

Figure 12 is a cross sectional view of a spring catch of the first embodiment;

Figures 13A-D progressively depict the extension/retraction of a second embodiment of the umbrella device;

25 Figures 14A-D depict a third embodiment of umbrella device, with Figures 14B-D depicting enlarged portions of Figure 14A;

Figure 15 is a partial structural view of the third embodiment during extension/retraction; and

Figures 16A-B depict a partial structural view of the central folding crib of the third embodiment, with Figure 16B depicting the folded crib.

### Detailed Description of Preferred Embodiments

Referring to Figures 1 and 2, there is shown a first embodiment of an umbrella device **10**. The device is shown secured to a user but may also be adapted to be used as a hand held umbrella.

5 Figure 1 depicts the umbrella device **10** having a canopy **12** supported by an arm assembly **14** extending from a base **16**. The arm assembly **14** is shown in a protracted configuration, supporting the canopy **12** above the user. The base **16** is secured to the user by means of a waist attachment **18** and a shoulder strap **20**. The base **16** is provided with a slidable extension **22** which enables the base to be elevated  
10 with respect to the waist attachment **18**.

Figure 2 depicts the umbrella device **10** with the arm assembly **14** in a retracted configuration and the canopy **12** collapsed against the base **16** and enclosed within a casing **24**.

Referring to Figures 3 to 5, the casing **24** of the umbrella device **10** is  
15 provided with a loop **26** for facilitating carrying of the umbrella device **10** by hand. The casing **24** also has three flaps extending from the base **16**, which are fastened together by means of hook and loop type fasteners **28**. Ties, press studs, buttons or other types of fasteners can alternatively be used. Figure 4 demonstrates the operation of the slidable extension **22**. The extension **22** is slidable from a retracted position in  
20 which the extension **22** does not protrude from the base **16** and an extended position in which the extension **22** raises the base **16** from the waist attachment **18**. The waist attachment **18**, provided at the lower end of the extension **22**, comprises a clip **19** suitable for clipping to a user's belt and a ring to which a waist strap can be attached if the user is not wearing a belt. In embodiments where the extension **22** is not  
25 required, the waist attachment **18** may be provided on the base **16**. Other means of securing the base **16** to the user are possible including other strap arrangements, elastic straps, a harness or as part of a garment.

When the umbrella device **10** is not in use, the extension **22** is retracted and the device **10** can be either worn attached to the body or carried by hand. When the  
30 umbrella device **10** is required to be used, it is attached to the body of the user, for example at the waist of the user by means of the waist attachment **18**. Depending on

the height of the user and length of the arm assembly 14, the base 16 may be required to be secured to the body of the user above the waist to ensure that the canopy 12 is expanded above the user's head. In this case, the extension 22 may be employed, raising the base 16 up the torso of the user. In this way, the umbrella device 10 is adjustable to fit different body sizes of the user. Once arranged at an appropriate height, the base may be further secured by means of the shoulder strap 20. The umbrella device 10 is then ready for deployment of the arm assembly 14 and canopy 12.

Figures 6 to 12 show the main structural components of the umbrella device 10, including an arm assembly 14 and a canopy mechanism 30. The canopy mechanism 30 is operatively associated with the arm assembly 14, such that the canopy mechanism 30 simultaneously opens and closes the canopy 12 as the arm assembly 14 is protracted and retracted, respectively. The canopy mechanism 30 comprises a shaft 32, having a proximal end 34 and a distal end 36, an axially mounted slide 38 and a plurality of foldable ribs 40. The ribs 40, which are operatively associated with the distal end 36 of the shaft 32 and with the slide 38, extend radially outwardly of the shaft 32 to the periphery of the canopy 12. Each rib 40 comprises a plurality (first to sixth) of pivotally associated links 42-52. The first link 42 is pivotally connected at an inner end to the slide 38. The second link 44 is pivotally connected at an inner end to the shaft distal end 36 and pivotally connected at an outer end to an intermediate portion of the first link 42. The fourth link 48 is pivotally connected at an inner end to an outer portion of the second link 44 and pivotally connected at an outer end to an inner end of the fourth link 48. The outer end of the first link 42 is pivotally connected to an inner portion of the fourth link 48 and an outer portion of the first link 42 is pivotally connected to an inner end of the fifth link 50. The outer end of the fifth link 50 is pivotally connected to the inner end of the sixth link 52 and the outer end of the fourth link 48 is pivotally connected to an inner portion of the sixth link 52.

Axial movement of the slide 38 towards the shaft distal end 36 causes the first link 42 to pivot outwardly from the slide 38 and about the outer end of the second link 44. This movement causes the second link 44 to pivot outwardly at the shaft distal end 36. The third link 46 is consequently drawn inwardly with respect to the

first link 42 by the second link 44, drawing the inner end of the fourth link 48 inwardly with respect to the first link 42 and causing the fourth link 48 to pivot about the outer end of the first link 42. Similarly, the fifth link 50 is drawn inwardly with respect to the fourth link 48 by the first link 42, drawing the inner end of the sixth link 52 inwardly with respect to the fourth link 48 and causing the sixth link 52 to pivot about the outer end of the fourth link 48. In this way, as the ribs 40 unfold, they extend radially outwardly as the slide 38 is driven toward the shaft distal end 36. Axial movement of the slide 38 towards the shaft proximal end 34 reverses the above process and folds the ribs 40 inwardly towards the shaft 32.

In the retracted configuration, the sixth and longest link 52 folds the peripheral edge of the canopy 12 adjacent the shaft distal end 36. This presents the inner surface of the canopy 12 outwardly and contains the outer and possibly wet surface within the folds, preventing the outer surface from contacting and wetting the user.

Alternatively, the canopy mechanism 30 may function independently of the arm assembly 14, requiring independent manual operation.

The arm assembly 14 comprises a plurality (first to sixth) of pivotally connected elongate members 54-64, each having proximal and distal ends. The arm assembly 14 is connected at its proximal end to the base 16 and at its distal end to the canopy mechanism 30. The arm assembly 14 is adapted to retract and protract between a retracted configuration in which the arm assembly 14 is arranged substantially flat against the base 16, disposing the canopy mechanism 30 laterally of the base 16, and a protracted configuration in which the arm assembly 14 extends substantially vertically of the base 16, disposing the canopy mechanism 30 vertically of the base 16.

The proximal end of the first member 54 is pivotally connected to the base 16. The proximal end of the second member 56 is pivotally connected to the base 16 below the first member 54. The distal end of the second member 56 is pivotally connected to the proximal end of the third member 58. An intermediate portion of the third member 58 is pivotally connected to an intermediate portion of the first member 54 and the distal end of the third member 58 is pivotally connected to the proximal end of the fourth member 60. The proximal end of the fifth member 62 is pivotally



connected to the distal end of the first member 54 and the distal end of the fifth member 62 is pivotally connected to an intermediate portion of the fourth member 60. The proximal end of the sixth member 64 is pivotally connected to the distal end of the first member 54 and the distal end of the sixth member 64 is pivotally connected to the shaft proximal end 34. The distal end of the fourth member 60 is pivotally connected to the slide 38 of the canopy mechanism 30.

In the retracted configuration, the distal ends of the first member 54, second member 56 and fourth member 60 are substantially adjacent, which retains the slide 38 substantially adjacent the shaft proximal end 34. During operation from the retracted closed configuration to the extended open configuration, the second member 56 pivots at the base 16 and the distal end of the second member 56 travels upwards in an arc extending laterally from the base 16. This draws the proximal end of the third member 58 towards the proximal end of the first member 54, which in turn, causes the first member 54 and third member 58 to pivot against one another in scissor fashion at their connected intermediate portions and draws the distal ends of the first member 54 and third member 58 towards one another. This in turn, draws the proximal ends of the fourth member 60 and the fifth member 62 towards one another, which causes the fourth member 60 to pivot about the distal end of the fifth member 62. This drives the distal end of the fourth member 60 away from the distal end of the first member 54. The sixth member 64 spaces the shaft proximal end 34 from the distal end of the first member 54 and accommodates the pivotal movement of the fifth member 62 at the distal end of the first member 54.

The separation of the distal ends of the first member 54 and the fourth member 60 drives the slide 38 towards the distal end of the shaft 32, which in turn, drives the canopy mechanism 30 to open the canopy 12, as previously described. This results in the arm assembly 14 taking the protracted configuration as shown in Figure 1. In the protracted configuration, each of the members extends substantially vertically from the base 16. The second member 56 is substantially parallel and adjacent to the base 16, the first member 54 is substantially parallel and adjacent to the third member 58 and the fourth member 60 is substantially parallel and adjacent to the shaft 32. Reversing the above process will collapse the canopy 12 and retract the arm assembly 14 to the retracted configuration, as shown in Figure 2.

Isolated drawings of the sixth member **64** and the slide **38** are provided in Figures 9 and 10, respectively. Figure 6 demonstrates one purpose of the sixth member **64** in spacing the shaft proximal end **34** from the arm assembly **14** and allowing the canopy mechanism **30** to be arranged laterally adjacent the arm assembly **14** and base **16**, providing a compact retracted configuration. The slide **38** is provided with a laterally projecting lobe **66** for connection to the distal end of the fourth member **60**. Both the lobe **66** and the sixth member **64** act to laterally space the canopy mechanism **30** from the arm assembly **14**, allowing each to operate without significant interference or impedance between any members of the arm assembly **14** and any components of the canopy mechanism **30**.

Accordingly, the umbrella device **10** can be conveniently worn by the user in a compact casing **24** when not in use and can be supported hands free on the body of the user when in use. Further, the path taken by the distal end of the arm assembly **14** during operation of the umbrella device allows the canopy **12** to be expanded away from the face of the user while the base **16** remains in an upright orientation. This advantageously allows the device to be held or secured upright in front of the user where it is convenient to operate.

Figure 11 shows the arm assembly **14** partially extended, demonstrating the operation of the arm assembly **14** during protraction/retraction. A spring biased catch **80** for locking the arm assembly **14** in the protracted configuration is shown provided at the top of the base **16**. The catch **80** acts as part of a reversible locking mechanism to maintain the umbrella in an upright position when it is in the open configuration. The catch **80** contains a lug **82** that is biased to an extended position within barrel **84** by spring **86**. In this example, a locking pin **88** is provided to act as the abutment means of the locking mechanism and extends from the second member **56** of the arm assembly **14**. During operation of the arm assembly **14** towards the protracted configuration, the pin **88** moves upwardly in an arc as the arm assembly **14** is protracted. The trajectory of the movement of the pin **88** is shown along the dotted line in Figures 11 and 12 for ease of illustration. As the arm assembly **14** is operated to the protracted configuration, the pin **88** forces the lug **82** into the barrel **84**. Once the pin **88** moves beyond the lug **82**, the spring **86** causes the lug **82** to move back to its extended position, thereby locking the pin **88** into a locked position, as indicated

by reference numeral **90**. The arm assembly **14** can be unlocked and retracted by pushing the lug **82** downwards to release pin **88**.

A second embodiment is depicted in Figures 13A-D. Like reference numerals to those used in relation to describing the first embodiment are used to denote like features in the second embodiment. The arm assembly **14** of this embodiment comprises two additional members **68** and **70**. One additional member **68** is pivotally connected between the distal end of the first member **54** and the proximal end of the fourth member **60** and the other additional member **70** is pivotally connected between the distal end of the third member **58** and the proximal end of the sixth member **64**. The two additional members **68** and **70** are also pivotally connected to each other in scissor fashion at intermediate portions of each member. This has the effect of increasing the protracted length of the arm assembly **14**. Other embodiments of the arm assembly **14** may comprise different numbers and different lengths of arm assembly members.

A third embodiment of the umbrella device **10** is shown in Figures 14A-D, 15 and 16A-B. Like reference numerals to those used in relation to describing the first embodiment are used to denote like features in the third embodiment. In this embodiment, the arm assembly **14** is bifurcated at hinge member **73**, as shown in Figure 14A, to allow the umbrella device **10** to be mounted centrally in front of the user, without obstructing the user's forward vision.

In this form, the proximal end of the first member **54** is pivotally connected to the base **16**. The proximal end of the pair of second members **56** is pivotally connected to the base **16** below the first member **54**. The distal ends of the second members **56** are pivotally connected to the proximal ends of the pair of third members **58**. An intermediate portion of each third member **58** is pivotally connected to an intermediate portion of the first member **54** and the distal ends of the third members **58** are pivotally connected to the proximal ends of the fifth members **70**. A hinge member **73** is pivotally connected to the distal end of the first member **54**. The proximal ends of the pair of fourth members **68** are pivotally connected to the hinge member **73** such that the fourth members **68** can pivot between a parallel configuration and a V-shaped configuration. An intermediate portion of each fourth member **68** is pivotally connected to an intermediate portion of one of the pair of fifth

members 70. The distal ends of the fourth members 68 are pivotally connected to the proximal ends of the sixth members 60 and the distal ends of the fifth members 70 are pivotally connected to the proximal ends of the seventh members 62. The distal end of the seventh members 62 are pivotally connected to an intermediate portion of the sixth members 60. The proximal ends of the eighth members 64 are pivotally connected to the distal ends of the fifth members 70 and the distal ends of the eighth members 64 are pivotally connected to the proximal ends 34 of the shafts 32. The distal ends of the sixth members 60 are pivotally connected to the slides 38 of the canopy mechanism 30.

The canopy mechanism 30 comprises dual shafts 32 and slides 38 joined by a central folding structure 72 where it unfolds at top hinge joint 74. During operation of the umbrella device 10, the bifurcated arm assembly 14 extends forwardly of the user as the canopy 12 is expanded. In the protracted open configuration the bifurcated arm assembly 14 extends centrally up the user's torso from the base 16 to a point below the chin where the bifurcated branches of the arm assembly 14 extend angularly upwardly in a Y-shape at the bottom hinge 76, laterally of the user's face. Accordingly, the umbrella device 10 can be secured centrally and in front of the user, without the arm assembly 14 significantly affecting the user's forward vision (Fig. 14A). To retract the canopy, the user pulls the top hinge 74 towards the hinge member 73 so that the central folding structure 72 folds at the top hinge joint 74, causing the two distal ends of the dual shafts 32 to move towards each other. The slides 38 are then pulled concomitantly downwards by fourth member 60 along the shafts 32 in the direction of the hinge member 73, and the Y-shape closes. When the canopy mechanism 30 is in its retracted configuration in this embodiment, its members are parallel to shafts 32 (Fig. 16B).

While the present invention has been described using the specific embodiment as shown in the aforementioned figures, it is understood that the figures are for illustration only and should not be taken as limitation of the invention. It is contemplated that many changes and modifications may be made by one of ordinary skills in the art without departing from the spirit and scope of invention described. For example, the exact position and type of joint 74 and the length of member 70, shafts 32 and ribs 72 as shown in Figure 16B depend on the size of the umbrella and

may be modified by a manufacturer according to the users need. Each of the above embodiments may also be detached from the user and used as a conventional hand held umbrella by holding the base 16, or arm assembly 14. It is therefore intended that the scope of the invention be defined by the claims appended hereto and their  
5 equivalents.